



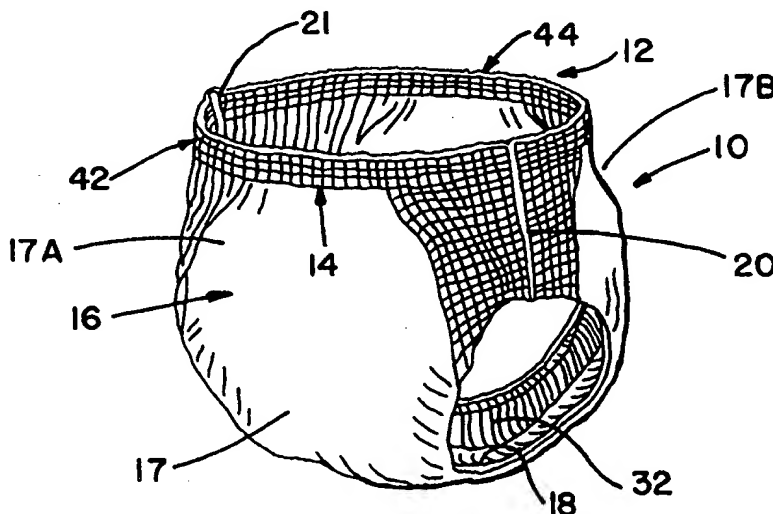
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: DISPOSABLE TRAINING PANT WITH ELASTICIZED SIDE PANELS

## (57) Abstract

A disposable absorbent article (10) which can be configured as a panty type garment, a disposable diaper, or an adult incontinent product, includes a back sheet (26), an absorbent panel (28) positioned on top of the back sheet (26), and a liquid permeable top sheet (30) positioned on top of the absorbent panel (28). A pair of longitudinally extending, elasticized unitary leg gather assemblies (32) are positioned on respective opposite sides of a longitudinal centerline (CL) of the article. Waist elastic elements (104, 105) extend partly or substantially totally across a waist encircling portion (12, 14) of the garment. Opposing side regions (19a-19d) of the garment each include a plurality of side elastic elements (106) which extend laterally, and are arranged spaced apart longitudinally between leg encircling regions (18), and the waist elastic elements (104). Each leg gather assembly (32) includes an outer sleeve (32') having an upstanding portion (34) within which are positioned elastically contractible elastic elements (38, 38') which effect conformance of the leg gather assemblies (32) with a wearer for desired containment.



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**DISPOSABLE TRAINING PANT WITH ELASTICIZED SIDE PANELS****Technical Field**

The present invention relates generally to a disposable absorbent article which is configured as a training pant, and more particularly to a disposable absorbent article having elasticized side regions formed with a plurality of generally parallel, laterally extending elastic elements for enhanced fit and economical manufacture.

**Background Of The Invention**

Disposable absorbent articles, such as disposable diapers and disposable pant-type garments (sometimes referred to as training pants), have found widespread acceptance. Garments of this nature are typically configured for a single use, with an absorbent panel or core construction ordinarily provided in an integrated structure including a liquid-pervious topsheet or facing layer, and a backsheet or backing layer having at least a portion which is liquid impervious. Pant-type garments include side seams which can be readily torn for removal of the garment if soiled, while adhesive-coated fastening tabs, or hook-and-loop fasteners are typically provided on disposable diapers. Absorbent articles of the above nature are not only suitable for infants, but can be appropriately sized and configured for incontinence use by adults.

Commonly assigned U.S. Patent No. 5,403,301 discloses a disposable absorbent garment of the type suitable for infant care and for use by incontinent adults. In order to enhance the containment characteristics, the construction includes elastics at laterally opposite side margins of the construction, thereby forming leg-encircling elasticized regions. This patent is hereby incorporated by reference.

The absorbent article disclosed in the above-referenced patent is configured for enhanced fit by the provision of elastic elements at the front and rear waist regions of the article. Experience has shown that elastics desirably acts to conform the article to the wearer, enhancing fit, comfort and containment. The present invention is particularly directed to an absorbent

article, preferably configured as training pants, having side panel regions which are economically elasticized by the provision of a plurality of generally parallel, laterally extending elastic strand-like elements.

### Summary Of The Invention

5                   A disposable absorbent article embodying the principles of the present invention can be configured as a pant-type garment or a disposable diaper for infants or small children, or can be appropriately sized and configured for use by incontinent adults. The article includes an elasticated waist band, elasticated side regions, and elasticated leg gathers extending  
10                   around leg openings and extending upwardly, overlapping the side regions. The leg openings are thereby substantially completely surrounded by elastics for better fit and liquid retention. The elasticated side regions are economically formed with a plurality of strand-like elastic elements predominantly positioned laterally outwardly of the absorbent panel of the  
15                   article.

                  The construction of the absorbent article includes an absorbent panel and a liquid permeable topsheet positioned on top of the absorbent panel. A backsheet positioned beneath the absorbent panel and extending laterally outwardly from opposite sides of the absorbent panel at longitudinal  
20                   end portions thereof defines a pair of front ear portions, and a pair of rear ear portions. The front and rear ear portions define leg-encircling openings of the garment. A central region extends laterally between the front ear portions and between the rear ear portions, and longitudinally connects the front and rear ear portions between the legs of the wearer. The central region includes a  
25                   crotch portion extending longitudinally between the front and rear ear portions of the garment. A pair of side seams respectively joins the front ear portions to the rear ear portions forming opposite side regions to provide the garment with a pant-like configuration, and also thereby defines a waist opening.

                  A plurality of generally parallel, laterally extending, elastic  
30                   elements joined to each of the front and rear ear portions provides elastics thereof, with each of the ear portions being elasticized by the elastic elements

substantially throughout its longitudinal extent from the respective one of the leg-encircling openings to the waist opening. A pair of elasticized gathers extends generally longitudinally of the garment at respective opposite sides of the absorbent panel, each of the gathers including an outer sleeve having a  
5 base edge fixed to one of the backsheet and the topsheet, and at least one gather elastic element positioned within a folded portion of the outer sleeve. The gather elastic element of each gather can be positioned in spaced apart relationship to the base edge of each respective gather. Each of the gather elastic elements extends longitudinally along and beyond the crotch portion so  
10 that the elasticized gathers and the elasticized ear portions together provide elastication substantially completely around each of the leg-encircling openings of the garment. The outer sleeves of the elasticized gathers can be formed separately from the topsheet and joined to the topsheet, or can be integrated with the topsheet such as by formation from the same piece of  
15 material.

A pair of waist elastic regions or bands respectively extend transversely of the garment beyond each end of the absorbent panel. Each of the waist elastic regions extends transversely across the central region and the respective ear portions to the side seams. The bands can alternately be  
20 localized in transverse extent, not extending across the ear portions. The waist elastic regions are each preferably formed by a plurality of elastic members or elastic strands extending along a length of the regions. Alternately, one strand may be used at each of front and rear waist regions to elasticallyate the waist of the article.

Preferably, at least one of the elastic elements of each leg gather assembly is positioned in sufficiently closely spaced relationship to associated components of the absorbent article for gathering the absorbent article for enhanced fit and aesthetic appeal. To such end, a base elastic element can be positioned respectively adjacent to each of the base edges of the elasticized  
30 gathers. Each of the base elastic elements is positioned within respective folded portions of the outer sleeves.

In accordance with the illustrated embodiment, the absorbent panel preferably comprises absorbent material such as comminuted wood pulp (wood fluff) with superabsorbent polymer distributed therein. The liquid pervious topsheet is positioned on top of the absorbent panel, with the  
5 topsheet being positionable generally adjacent to a wearer during use of the article.

In accordance with the present invention, the pair of longitudinally extending elasticized leg gather assemblies are positioned on respective opposite sides of a longitudinal centerline of the article. The outer  
10 sleeves of the leg gather assemblies are joined to the topsheet of the article, and contain at least two, and preferably three or more, elastically contractible elastic elements. The elastic elements are positioned in spaced apart relationship within an upstanding portion of the outer sleeve of each leg gather assembly, in a manner which desirably acts to distribute the elastic  
15 contraction forces generated by the elements along a substantial portion of the vertical extent of each leg gather assembly. To this end, it is preferred that at least one elastic element be positioned within an upper half of the upstanding portion of each outer sleeve. While elastication of the article is effected by the provision of the elastic elements of the leg gather assemblies, it is  
20 presently preferred that the side marginal portions of the article are not otherwise elasticized. The resultant construction not only provides the desired containment and fit characteristics, with enhanced aesthetic appeal, but also facilitates high-speed manufacture for economical use.

In the preferred form, the outer sleeve of each leg gather  
25 assembly comprises hydrophobic nonwoven fabric, and may be configured as a composite including nonwoven fabric and an associated plastic film layer. In the illustrated form, the upper sleeve of each leg gather assembly includes a base portion, which base portion may be joined to a respective lateral edge of the topsheet and extends laterally outwardly therefrom to a respective side  
30 edge of the article. Alternatively, the topsheet can be configured to extend laterally outwardly beneath the leg gather assemblies to the side edges of the

absorbent article, with each leg gather assembly having a ribbon-like configuration, respectively positioned on top of the topsheet of the article.

5 The invention provides stretch sides for a pant-like absorbent article without having separate stretch elements bonded to a central region of the article. This configuration of elastic allows the achievement of a better fit without laterally gathering or corrugating the central region, particularly the tummy area and the crotch portion. The configuration also allows for a complete elastic encircling of the leg openings leading to better containment performance.

10 Other features and advantages of the present invention will become readily apparent from the following detailed description, the accompanying drawings, and the appended claims.

#### **Brief Description Of The Drawings**

15 FIGURE 1 is a perspective view of a disposable absorbent article, configured as disposable training pants, embodying the principles of the present invention generally as it appears when being worn;

FIGURE 2 is a top perspective view of the present absorbent article generally in a form prior to final assembly;

20 FIGURE 3 is an exploded perspective view of the training pants of FIGURE 2;

FIGURE 4 is a top plan view of the training pants of FIGURE 2;

FIGURE 5 is a fragmentary cross-sectional view taken generally along lines 5-5 of FIGURE 4;

25 FIGURE 6 is a fragmentary cross-sectional view taken generally along lines 6-6 of FIGURE 4;

FIGURE 7 is a fragmentary cross-sectional view taken generally along lines 7-7 of FIGURE 4;

30 FIGURE 8 is a fragmentary cross-sectional view similar to FIGURE 7 showing an alternate construction of the present invention.

#### **Detailed Description**

While the present invention is susceptible of embodiment in various forms, there is shown in the drawings and will hereinafter be described presently preferred embodiments, with the understanding that the present disclosure is to be considered as an exemplification of the invention, and is not intended to limit the invention to the specific embodiment illustrated.

With reference now to the drawings, therein is illustrated a disposable absorbent article 10, illustrated as disposable training pants or a "pull-up" diaper, embodying the principles of the present invention. As used in the present disclosure, the training pants are intended to refer to an absorbent article or garment which is worn by an individual for absorbing urine and/or fecal matter. It is understood that garments embodying the principles of the present invention are ordinarily sized for use by infants and children, but can also be appropriately sized for use by incontinent adults. While absorbent article 10 has been illustrated as disposable training pants, it will be understood that an article embodying the principles of the present invention can be configured as a diaper, including a fastening arrangement for fitting the article about a wearer so as to define a waist opening and a pair of leg openings.

With particular reference to FIGURE 2, the article is shown before final assembly into the configuration of FIGURE 1. The absorbent article 10 includes a narrow, rectangular rear waist portion 12, a narrow, rectangular front waist portion 14, and a substantially rectangular central region 16 longitudinally extending between the front and rear waist portions 12, 14 and including a crotch portion 17. The crotch portion of the garment generally corresponds to that portion which is positioned between the legs of a wearer during use, and as used therein, comprises between about  $\frac{1}{3}$  and  $\frac{3}{4}$  of the longitudinal extent of the garment.

The central region 16 also includes a tummy area 17a which is above the crotch portion 17 and below the front waist portion 14; and a lower



back area 17b which is above the crotch portion 17 and below the rear waist portion 12.

5 Ear portions 19a, 19b, 19c, 19d extend laterally outwardly from the central region 16, one at each of four corners of the central region. The ear portions 19a, 19b, 19c, and 19d are each bounded by the central region 16, a respective leg cut-out 18 and a respective waist portion 12, 14.

10 The absorbent article 10 is assembled by side connections such as a pair of adhesively secured or sonically welded side seams 20, 21 (shown in FIGURE 1) between edges 20a, 20b and 21a, 21b, respectively, forming a pant-shaped garment when assembled. When the embodiment of the invention is configured as a diaper, side seams connections are made by tape tabs (not shown) which are positioned for securement to the outside surface of the front waist portion 14, and to this end, a tape landing zone is preferably provided. The tape landing zone typically comprises a strip of polymeric  
15 sheet material which the tape tabs can be securely, yet movably applied, with the landing zone desirably acting to reinforce the front outside surface of the garment so that removal and re-application of the tape tabs does not damage the article. A suitable fastening arrangement can alternatively be provided by the provision of hook-and-loop-type fasteners (not shown), with tape tabs  
20 provided with suitable hook material, and with the region generally corresponding to tape landing zone provided with suitable loop material.

In accordance with the illustrated embodiment, front and rear waist elastic regions 42, 44, such as comprising elastic elements or strands, are preferably provided within the front and rear waist portions 14, 12, along  
25 laterally extending edges of the backsheet 26 for enhanced fit, containment, and comfort. In the preferred embodiment, a plurality of elastic elements or strands 104, 105 (shown in FIGURES 3 and 4) span entirely across the front and rear waist portions 14, 12.

30 The ear portions 19a, 19b, 19c, and 19d are elasticized by a plurality of laterally extending, and longitudinally spaced side elastic strands 106 (shown in FIGURES 3 and 4) which each extend between a respective

edge 20a, 20b, 21a, 21b of the ear portions and the central region 16. When the ear portions 19a, 19b, 19c, and 19d are respectively connected along the edges 20a, 20b, 21a, 21b to form the structure of FIGURE 1, the ear portions 19a, 19b, 19c, and 19d together form elasticated, opposite side regions of the article 10.

It is presently preferred that both pair of front ear portions 19a, 19b, as well as the pair of rear ear portions 19c, 19d, be elasticized by strands 106. However, it is within the purview of the present invention that only the pair of front ear portions be so-elasticized, or only the pair of rear ear portions. Additional elastic elements can be provided in the ear portions, in addition to parallel laterally extending elastic elements 106, such elastic elements extending perpendicularly or diagonally with respect to elements 106, or otherwise, including randomized placement of additional elastic elements.

With reference to FIGURE 3 through 6, the absorbent article 10 includes a backsheet 26 which generally defines the outer surface of the garment. The backsheet 26 can be configured as a composite or laminate of an outer nonwoven fabric layer 102 (such as a carded fabric), and an inner nonwoven layer 110 (shown partially in FIGURE 3). Alternatively, the entire backsheet 26 can be formed from suitable polymeric film material (such as a polyethylene sheet having a thickness on the order of 0.0005 to 0.001 inches). However, it is presently preferred that plastic film material only be positioned beneath the absorbent panel of the article. Polyethylene terephthalate sheet material having a thickness of approximately 0.0005 to 0.001 inches may alternately be employed.

The inner nonwoven layer 110 can be substantially coextensive with the outer nonwoven fabric layer 102, or can comprise a pair of nonwoven fabric components which respectively extend laterally across and between the front ear portion and the rear ear portions. The laterally extending ear portions 19a, 19b, 19c, 19d can be extended portions of the backsheet 26, i.e., composed of the nonwoven layer 102, 110. The ear

portions (the side regions of the finished article) can thus exhibit desired breathability (by virtue of the nonwoven fabric material in these areas) for enhanced comfort by the wearer. When layer 110 is provided in the form of a pair of nonwoven fabric components, as described above, elastic element 5 106 can be secured thereto prior to placement on layer 102. The components of layer 110 can themselves comprise two or more layers of nonwoven fabric, with elements 106 positioned therein in a sandwich-like fashion.

The absorbent article 10 includes an absorbent panel 28 positioned on top of a liquid barrier film 112 which is secured to the 10 backsheet 26, with the barrier film 112 dimensioned at least as large as the absorbent panel 28. The absorbent panel preferably comprises an absorbent matrix including comminuted wood pulp, sometimes referred to a wood fluff, and superabsorbent material, which may comprise superabsorbent polymers or the like. Absorbent matrices comprising blends and/or layers of absorbent 15 material can be employed. If desired, the superabsorbent material may be concentrated in specifically selected regions of the absorbent panel.

In the preferred embodiment, a liquid distributing transfer layer 29 is positioned on top of the absorbent panel 28. The transfer layer preferably comprises a low basis weight nonwoven fabric layer, which in a 20 presently preferred form, comprises thermally bonded bi-component fibers of polyester and polypropylene, having a basis weight of 40 grams per square meter. Suitable material can be obtained from Fiberweb North America, Inc., under the product designation DFPN156.

Absorbent article 10 includes a topsheet 30 positioned on top of 25 the absorbent panel 28. The topsheet 30 can be configured in accordance with the illustrated embodiment, to have a longitudinal extent substantially extending the length of the crotch portion 17 of the article 10, and a transverse dimension such that the topsheet 30 has side edges spaced inwardly of respective side edges of the article 10. In this construction, each of the 30 side edges of the topsheet 30 is respectively joined to a unitary leg gather assembly, designated 32, in accordance with the principles of the present

invention. The outer sleeves of the elasticized gathers can be formed separately from the topsheet and joined to the topsheet, or can be integrated with the topsheet.

The embodiment shown in FIGURES 3 and 4 uses a topsheet 30 which has a lateral extent substantially within the central region 16, i.e., not overlying the ear portions 19a, 19b, 19c, 19d. However, it is also contemplated by the invention that the ear portions 19a, 19b, 19c, 19d can also be formed by extending portions of the topsheet 30 rather than the backsheet 26. The ear portions 19a, 19b, 19c, 19d can also be found by extensions of both the backsheet 26 and the topsheet 30.

FIGURE 3 demonstrates in detail the assembly of the various layers which together make up the absorbent article 10. The backsheet 26 includes the nonwoven fabric layer 102 upon which is carried the front waist elastic strands 104, the rear waist elastic strands 105 and the side elastic strands 106. The elastic strands 104, 105, and 106 are secured by an adhesive. The elastic strands 104, 105 are separated longitudinally at about a .25 inch spacing. The side elastic strands 106 are located longitudinally between the leg openings 18 and the waist elastics 104 and 105 within the four areas 19a, 19b, 19c and 19d. The side elastic strands 106 provide an elastication of the article 10 through the tummy area 17a, the lower back area 17b, and around the leg cut-outs 18.

The side elastic strands 106 are installed onto the nonwoven fabric layer 102 by stretching double-length strands entirely across the ear portions 19a, 19b, 19c, and 19d and respective tummy and lower back areas 17a, 17b and cutting along a longitudinal centerline CL. Cut ends of the strands then separate by elastic force from the centerline CL outwardly by about 4 inches, indicated as dimension F. Thus, the tummy area 17a and the crotch portion 17 are left non-elasticated. This is an important advantage of the embodiment of the invention which avoids gathering or corrugating the tummy area 17a and the crotch portion 17, for a more comfortable fit and a smoother appearance of the article.

The side elastic strands 106 can advantageously be spaced longitudinally from between 1/16" to 2", and preferably at .25 inches. The spacing of the elastic strands 106 can be varied. Advantageously, between fourteen (14) and twenty (20) side elastic strands can be applied to each ear portion, although the invention is not limited to this range. Preferably, seventeen (17) side elastic strands, spaced at .25 inches, are applied to each ear portion. The ear portion dimension "G" can also be about 4 inches, for each of the ear portions 19a, 19b, 19c, and 19d extending to a respective edge of the backsheet 26.

The inner nonwoven layer 110 is adhesively secured covering the elastic strands 104, 105, 106 and the outer nonwoven layer 102. The elastic strands 104, 105, 106 are thus captured between the outer nonwoven layer 102 and the inner nonwoven layer 110.

The barrier film 112 is applied to the inner nonwoven layer 110 and adhesively secured thereto. The core layer 28 is applied onto the barrier film 112. The transfer layer 29 is applied onto the core 28. The topsheet 30 is applied over the core and transfer layer and onto the barrier film 112. Opposing leg gathers 32 are applied partially onto the topsheet 30 and also onto the barrier film 112. The leg gather assemblies are attached along lines approximately one half inch inward from the edges of the leg openings 18.

Two nonwoven strips 180, 182 are adhesively secured across the article, securing longitudinal ends 32a of the gather assemblies 32 to the top sheet 30 and serving a reinforcing purpose. The strips 180, 182 are also secured along their length to the inner nonwoven layer 110 as shown in FIGURES 5 and 6.

All the layers which are stacked to construct the article can be secured using intervening layers or coatings of construction adhesive (not shown).

FIGURE 4 demonstrates an important feature of the invention in that the leg gather elastic strands 38, 38' extend longitudinally to overlap the side elastic strands 106 by distances 184, 185. When the article 10 is

assembled, the overlap ensures a complete elastication around the leg cut-outs 18, to provide enhanced containment and fit characteristics.

As shown in FIGURE 7, the topsheet is joined to each leg gather assembly 32 by a respective bond 33, which may comprise sonic bonding or suitable adhesive. Each of the longitudinally extending leg gather assemblies 32 is elasticized in a specifically configured arrangement to provide the desired containment and fit characteristics for the disposable absorbent article 10. Specifically, each leg gather assembly 32 includes an outer sleeve 32' preferably comprising nonwoven fabric having an upstanding portion 34, and a laterally extending base portion 36. Within the outer sleeve are arranged a plurality of elastic strands 38 and a lowest-most elastic strand 38'.

In the illustrated embodiment of FIGURE 7, the base portion 36 of the outer sleeve extends laterally outwardly from the topsheet to the respective side edge of the absorbent article and is joined to the backsheet 26, particularly the inner layer 110, with suitable adhesive or by sonic bonding indicated at 35. However, in a presently preferred embodiment, the outer sleeve can be configured such that the base portion extends laterally inwardly only or outwardly only, such as in an L-shaped configuration.

As a further alternate design, as illustrated in FIGURE 8, a wider topsheet 30' can extend beneath each of the leg gather assemblies 32 laterally outwardly toward the side edges of the article 10, and can be joined to the backsheet 26 with suitable adhesive or sonic bonding. As shown, the topsheet 30' is secured by a bond 35' to the inner nonwoven layer 110. The extending base portion 36 is secured to the topsheet 30' by a bond 33' along an edge inward of the upstanding portion 34, and by a bond 36' along an edge outward of the upstanding portion 34. The bonds 33' and 36' can be suitable adhesive bonds or sonic bonds.

As illustrated in the preferred embodiment of FIGURE 7, each leg gather assembly 32 is arranged to have a generally inverted T-shaped configuration, wherein the base portion 36 extends beneath, and inwardly and

outwardly of, the associated upstanding portion 34. While the free edges of the material forming the outer sleeve are illustrated as being positioned at the base portion 36, these free edges can be otherwise positioned, such as at the uppermost position 39 of the outer sleeve 32'.

5           The upstanding portion 34 of the outer sleeve 32' of each leg gather assembly provides the desired sleeve-like configuration for each leg gather assembly within which the plural elastic elements of each leg gather assembly are positioned. The outer sleeve of each leg gather assembly can be secured or fixed in this narrow sleeve-like configuration by suitable bonding, such as by the application of spray adhesive 37, or by the provision of  
10           suitable sonic bonding. The walls of the outer sleeve would thus be squeezed or collapsed together between elastic elements 38, 38' and adhesively secured in that configuration.

          Elastication of the outer sleeve 32' of each leg gather  
15           assembly causes the upstanding portion 34 thereof to assume a generally upstanding vertical orientation with respect to the associated topsheet 30. By this arrangement, each leg gather assembly tends to extend generally toward the perineal region of the wearer, generally toward what is sometimes referred to as the "thigh crease".

20           One or more of the elastic elements 38, 38' act as a crotch elastic member by respectively extending along each side of the absorbent panel in the crotch portion 17. Each of the crotch elastic members can extend beyond the crotch portion adjacent to the elasticized regions of the ear portions 19a, 19b, 19c, 19d. It is presently preferred that base elastic element  
25           38' only extend along the length of the crotch portion of the article. The elastic elements 38, along with the side elastic elements 106, thus can serve the function of elasticizing all around the leg openings defined by the cut-outs 18.

          In accordance with the present invention, enhanced containment  
30           and fit are provided by the provision of at least two, and preferably three or more elastic elements within the outer sleeve of each of the leg gather

assemblies 32. In a presently preferred embodiment, three, and preferably four, evenly spaced apart elastic elements 38, 38' are provided within the upstanding portion 34 of the outer sleeve of each leg gather assembly 32. In a current embodiment, the elastic elements are evenly spaced apart by about 11 mm, with the lowermost elastic 38' spaced throughout its extent from the backsheet 26 by about 2 mm.

As noted above, the leg gather assemblies 32 of the present disposable absorbent article have been particularly configured for enhanced containment and fit, thereby permitting the side marginal portions of the article to otherwise be non-elasticized. To this end, at least two of the elastic elements are provided within the outer sleeve of each leg gather assembly, with at least one elastic element provided in an upper half of each upstanding portion 34 of the respective outer sleeve, and at least one elastic element positioned within the lower half of the upstanding portion of each outer sleeve. In order to create the desired fit characteristics, one of the elastic elements positioned within the lower half of the upstanding portion of the outer sleeve can exert a greater elastic gathering force on the outer sleeve than one of the elastic elements in the upper half of the upstanding portion. In accordance with the illustrated embodiment, one of the elastic elements exerting the greater gathering force, designated 38', is positioned within the lower half of the upstanding portion 34 of outer sleeve 32', and can be positioned in spaced relationship from the backsheet 26 throughout its extent. The lowest-most elastic element 38' can be located in the outer sleeve 32' or otherwise closely spaced or adjacent to the backsheet.

Thus, the elastic element 38' in each leg gather assembly 32 spaced furthest from the uppermost position 39 of the outer sleeve 32' exerts a greater elastic gathering force on the respective outer sleeve than the other ones of the elastic elements.

By the provision of at least three substantially evenly spaced apart elastic elements 38, 38' positioned within the respective outer sleeve 32', elastic contraction forces generated by the elastic elements are distributed



along a substantial portion of the vertical extent of each leg gather assembly. By the preferred provision of a lowermost one of the elastic elements being in a configuration so as to exert a greater elastic gathering force than the other ones of the elements, gathering of the backsheet 26, and the associated  
5 absorbent panel 28, at the leg openings, is effected for enhanced fit of the article, thus enhancing the aesthetics of the article. Enhanced containment is also achieved by this enhanced fit, since it permits the elasticized upstanding portion 34 of each leg gather assembly 32 to conform to the wearer as intended.

10 As noted, the preferred embodiment of the present invention is configured such that the side marginal portions of the article, i.e., those portions of the construction disposed generally laterally outwardly of bonds 33 (or 33' in FIGURE 8), are non-elasticized, other than by the elastication provided by the elastic elements 38, 38' of each leg gather assembly 32. As  
15 such, the base portion 36 of the outer sleeve of each leg gather assembly is non-elasticized, except by any elastication provided by the spaced apart elastic elements 38, 38'. However, additional longitudinally extending elastic elements can be provided generally beneath or outwardly of each gather assembly 32.

20 Configuring elastic element 38' for exerting a greater elastic gathering force on the outer sleeve of each leg gather assembly 32 can be effected in any of a variety of ways. If desired, the elastic element 38' can have an untensioned cross-sectional area greater than the other elastic elements 38, and thus exhibit a greater modulus of elasticity. Elastic element  
25 38' can comprise material which is different than the other elastic elements 38, and thus be configured to exhibit a greater modulus of elasticity. If desired, the elastic element 38' can be subjected to greater elongation than the other ones of the elastic elements, and thus be configured to create a greater elastic gathering force than the other elements, even if exhibiting an  
30 untensioned cross-sectional area which is the same as the other elements.

In the preferred form, the outer sleeve of each of the leg gather assemblies 32 preferably comprises hydrophobic nonwoven fabric, thereby resisting the passage of liquid therethrough. A suitable fabric can comprise spunbonded polypropylene nonwoven fabric having a basis weight in the  
5 range of about 0.03 to 0.8 ounces per square yard and a bond area in the range of 7% to 20%, with a basis weight of about 0.5 to 0.6 ounces per square yard, and an 18% bond area being particularly preferred. When untreated, this material exhibits the desired degree of hydrophobicity. One commercially available material of this type is available from Fiberweb of  
10 America, Greenville, South Carolina, under the product designation Unicorn Celestra.

The topsheet 30 (or 30' in FIGURE 8) may also comprise a polypropylene nonwoven fabric having a basis weight and bond areas described above for the outer sleeves of the leg gather assemblies 32. While  
15 the liquid permeability characteristics of the topsheet 30 (or 30') can be selectively varied while keeping with the principles disclosed herein, it is presently preferred that the topsheet 30 (or 30') be selected to exhibit significantly greater hydrophilicity, and thus, greater liquid permeability, than the outer sleeves 32' of the leg gather assemblies 32. To this end,  
20 polypropylene nonwoven material such as described above is ordinarily treated with a surfactant to achieve the desired hydrophilicity. Alternatively, a hydrophobic fabric having apertures to permit liquid passage therethrough may be employed.

In the preferred form, the upstanding portion 34 of each of the  
25 leg gather assemblies 32 is partially secured to the top surface of the associated topsheet 30 (or 30'). In particular, at least one longitudinal end of the upstanding portion 34 of the outer sleeve of each leg gather assembly is secured inwardly to the topsheet, such as by suitable adhesive or sonic bonding, as indicated at 38a. Most preferably, approximately 10% of the total  
30 length of each leg gather assembly 32 is secured at each end of each leg gather assembly (i.e., 20% of the entire length is attached to the topsheet).

Additional design features are preferred in configuring the present disposable absorbent article 10 for the desired containment and fit characteristics. It is believed that the elastically contractible gathering force asserted from each leg gather assembly on the associated article components, including the backsheet 26, should effect contraction from a fully elongated length in the range from about 20% to 50%. This is preferably achieved by positioning the lowermost elastic element 38' no more than about .25 inches from the backsheet 26.

The disposition of each leg gather assembly 32 with respect to the associated absorbent panel 28 is such that the base portion 36 of each leg gather assembly is preferably no more than about 1 inch away from the narrowest portion of the absorbent panel, with this base portion being preferably positioned no more than about 1 inch inwardly from the respective side edge of the article.

While leg gather assemblies 32 have been illustrated as being generally linear and in parallel relationship to each other and to the centerline of the disposable article 10, it is within the purview of the present invention to position the leg gather assemblies in a curved or otherwise non-parallel configuration. For example, the ribbon-like leg gather assemblies 32 illustrated in FIGURE 7 can be formed to each have a length preferably at least 10% greater than that of the absorbent article, and then attached to the article to each define a curved configuration by virtue of the "extra material" of each leg gather assembly.

From the foregoing, it will be observed that numerous modifications and variations can be effected without departing from the true spirit and scope of the novel concept of the present invention. It is to be understood that no limitation with respect to the specific embodiments illustrated herein is intended or should be inferred. The disclosure is intended to cover, by the appended claims, all such modifications as fall within the scope of the claims.

## WHAT IS CLAIMED IS:

1. A disposable absorbent garment comprising:

an absorbent panel;

5 a liquid permeable topsheet positioned on top of said absorbent panel;

a backsheet positioned beneath said absorbent panel and extending laterally outwardly from opposite sides of said absorbent panel at longitudinal end portions thereof to define a pair of front ear portions, and a pair of rear ear portions, said ear portions defining leg-encircling openings of said garment together with a crotch portion of said garment extending between said front and rear ear portions of said garment;

a pair of side seams respectively joining said front ear portions to said rear ear portions to provide said garment with a panty-like configuration and define a waist opening;

15 a plurality of generally parallel laterally extending elastic elements joined to each of said front and rear ear portions to provide elasticsation thereof, each said ear portion being elasticized by said elastic elements substantially throughout its longitudinal extent from the respective one of said leg-encircling opening to said waist opening; and

20 a pair of elasticized gathers extending generally longitudinally of said garment at respective opposite sides of said absorbent panel, each said gather comprising an outer sleeve having a base edge affixed to one of said backsheet and said topsheet, and at least one gather elastic element positioned within a folded portion of said outer sleeve in spaced apart relationship to said base edge, each said gather elastic element extending longitudinally along and beyond said crotch portion so that said elasticized gathers and said elasticized ear portions together provide elasticsation substantially completely about each

25 of said leg-encircling openings of said garment.

30 2. A disposable absorbent garment in accordance with claim 1, including

a pair of waist elastic elements respectively extending transversely of said garment beyond each end of said absorbent panel.

3. A disposable absorbent garment in accordance with claim 2, wherein

5 each said waist elastic element extends transversely through the respective ear portions to said side seams.

4. A disposable absorbent garment in accordance with claim 1, including

10 a pair of base elastic elements respectively positioned adjacent to said base edges of said elasticized gathers.

5. A disposable absorbent garment in accordance with claim 4, wherein

each said base elastic element is positioned within said folded portion of the respective outer sleeve.

15 6. A disposable absorbent garment in accordance with claim 1, wherein

said outer sleeves of said elasticized gathers are formed separately from and joined to said topsheet.

7. A disposable absorbent garment, comprising:

20 a liquid permeable topsheet;

a backsheet;

an absorbent panel positioned between said topsheet and said backsheet;

25 at least one of said topsheet and said backsheet extending laterally outwardly from opposite sides of said absorbent panel at longitudinal end portions of said panel to define a pair of front ear portions, and a pair of rear ear portions of said garment, said ear portions defining leg-encircling openings of said garment generally adjacent to a crotch portion extending between said front and rear ear portions of said garment;

a pair of side seams respectively joining said front ear portions to said rear ear portions to provide said garment with a panty-like configuration, and define a waist opening; and

a plurality of generally parallel elastic elements joined to at least one of said pairs of said front and rear ear portions for gathering the pair of ear portions to provide elastication thereof, each said elastic element extending laterally from a respective one of said side seams and terminating generally in alignment with the respective side of said absorbent panel;

said elastic element providing elastication of said pair of said ear portions throughout elasticized regions thereof adjacent said absorbent panel from the respective leg-encircling opening to at least the respective longitudinal end of the absorbent panel.

8. A disposable absorbent garment in accordance with claim 7, including

a pair of waist elastic elements respectively extending transversely of said garment beyond each end of said absorbent panel through the respective ear portions, said elasticized regions of said ear portions extending from the respective leg-encircling opening to the respective waist elastic member.

9. A disposable absorbent garment in accordance with claim 7, including

a pair of crotch elastic members respectively extending along each side of said absorbent panel in said crotch portion, each said crotch elastic member extending beyond said crotch portion adjacent to the elasticized regions of the respective front and rear ear portions.

10. A disposable absorbent garment in accordance with claim 9, including

a pair of outer sleeves respectively surrounding said crotch elastic members.

11. A disposable absorbent garment in accordance with claim 7, wherein

said plurality of generally parallel elastic elements comprise between fourteen and twenty generally parallel elastic elements joined to said at least one pair of said front and rear ear portions.

12. A disposable absorbent article, comprising:

5

a backsheet;

an absorbent panel positioned on top of said backsheet;

a topsheet positioned on top of said absorbent panel; and

one of said backsheet and said topsheet shaped to conform to

10

the lower torso of a wearer in a panty-like configuration, and having side regions and a central region, said side regions connected together by said central region and each side region having a lateral elasticsation by each side region including at least one elongate elastic member, said elasticsation terminating at said central region;

15

a pair of longitudinally extending, elasticsized leg gather assemblies positioned on respective opposite sides of a longitudinal centerline of said article, each said leg gather assembly including an outer sleeve joined to said topsheet, and

20

at least one elastic element for distributing elastic contraction forces generated by said elastic element along a substantial portion of the vertical extent of each leg gather assembly for conforming each leg gather assembly to the wearer for enhanced containment, said elastic element extending to a vertical position overlapping said at least one elongate elastic member of an adjacent one of said side regions.

25

13. A disposable absorbent article in accordance with claim

12, wherein

said sleeve portion of each said leg gather assembly includes a base portion extending laterally outwardly from said topsheet to a respective side edge of said absorbent article.

30

14. A disposable absorbent article in accordance with claim

12, wherein

said topsheet extends laterally outwardly beneath said leg gather assemblies to side edges of said absorbent article.

15. A disposable absorbent article in accordance with claim 12, wherein

5 said outer sleeve of each said leg gather assembly comprises hydrophobic nonwoven fabric.

16. A disposable absorbent article in accordance with claim 12, further comprising

10 an elastic band at least partially across a lateral dimension of said backsheet, at least partially between said side regions.

17. A disposable absorbent article in accordance with claim 15, wherein

15 said elastic band comprises a first elongate elastic strand extending across a front portion of said backsheet and a second elongate elastic strand extending across a rear portion of said backsheet.

18. A disposable absorbent article in accordance with claim 17, wherein each of said side regions includes a plurality of parallel extending and spaced apart elastic strands transversing a lateral span of said respective side region and terminating at opposite ends at said central region.

20 19. A disposable absorbent article according to claim 12, wherein

said outer sleeves are composed of hydrophobic material and said topsheet is composed of a hydrophilic material.

25 20. A disposable absorbent article according to claim 12, including

a pair of waist elastic elements respectively extending transversely of said article beyond each end of said absorbent panel.

21. A disposable absorbent article according to claim 12, wherein

30 said backsheet comprises a carded nonwoven base layer, an inner nonwoven layer, and a liquid impermeable barrier film, all adhesively



secured together to form a laminate, and said side regions comprising a plurality of generally parallel, laterally extending elastic members adhesively secured between said base layer and said inner nonwoven layer.

5                   22.    A disposable absorbent article in accordance with claim 12 further comprising

front and rear nonwoven strips each adhesively secured across said topsheet and onto said backsheet and across front and rear longitudinal edges of said outer sleeves to reinforce connection of said outer sleeves to said topsheet.

10                   23.    A disposable absorbent article in accordance with claim 11, wherein

said at least one elongate elastic member is one of between fourteen and twenty elongate elastic members longitudinally spaced apart and spanning said side regions and having free ends laterally spaced from free ends of the elongate elastic members of the respective opposite side region.

15                   24.    A disposable absorbent article in accordance with claim 23, wherein

said at least one elongate elastic member is one of seventeen elongate elastic members.

FIG. 1

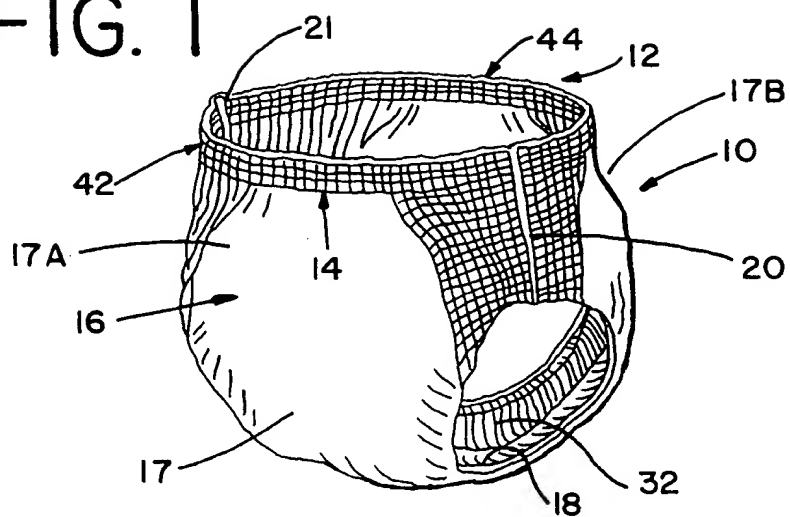


FIG. 2

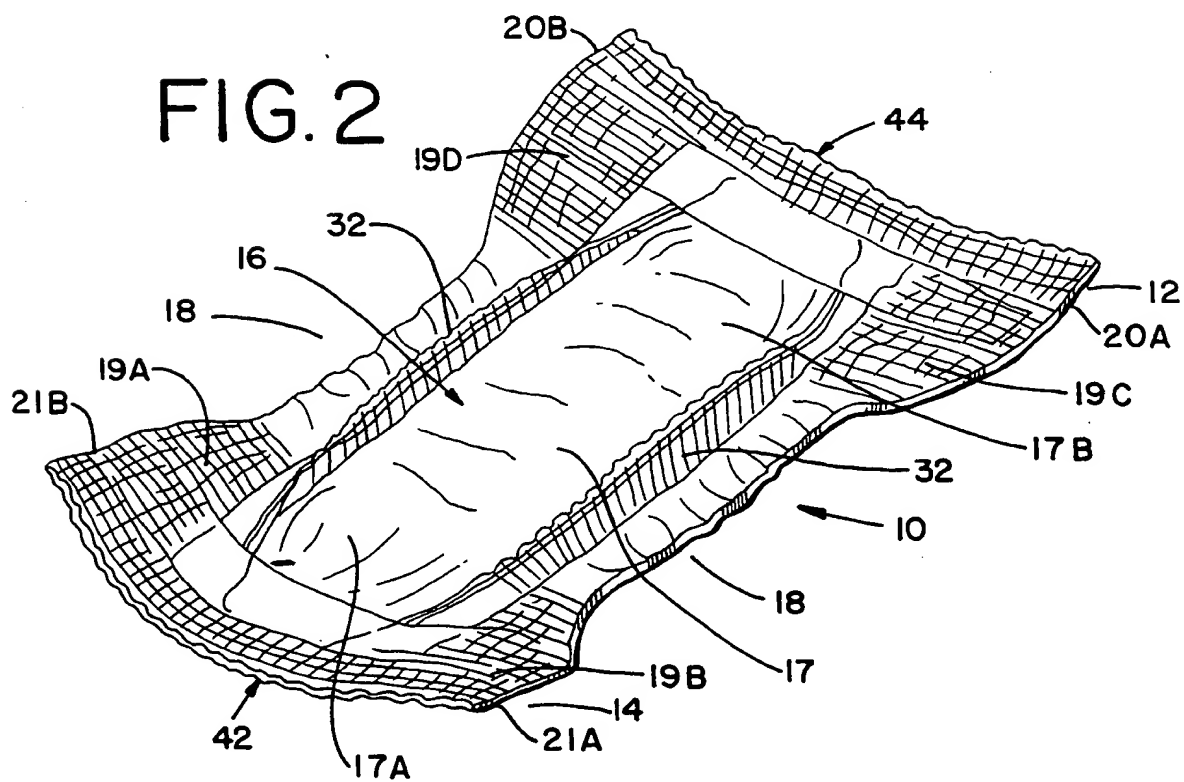
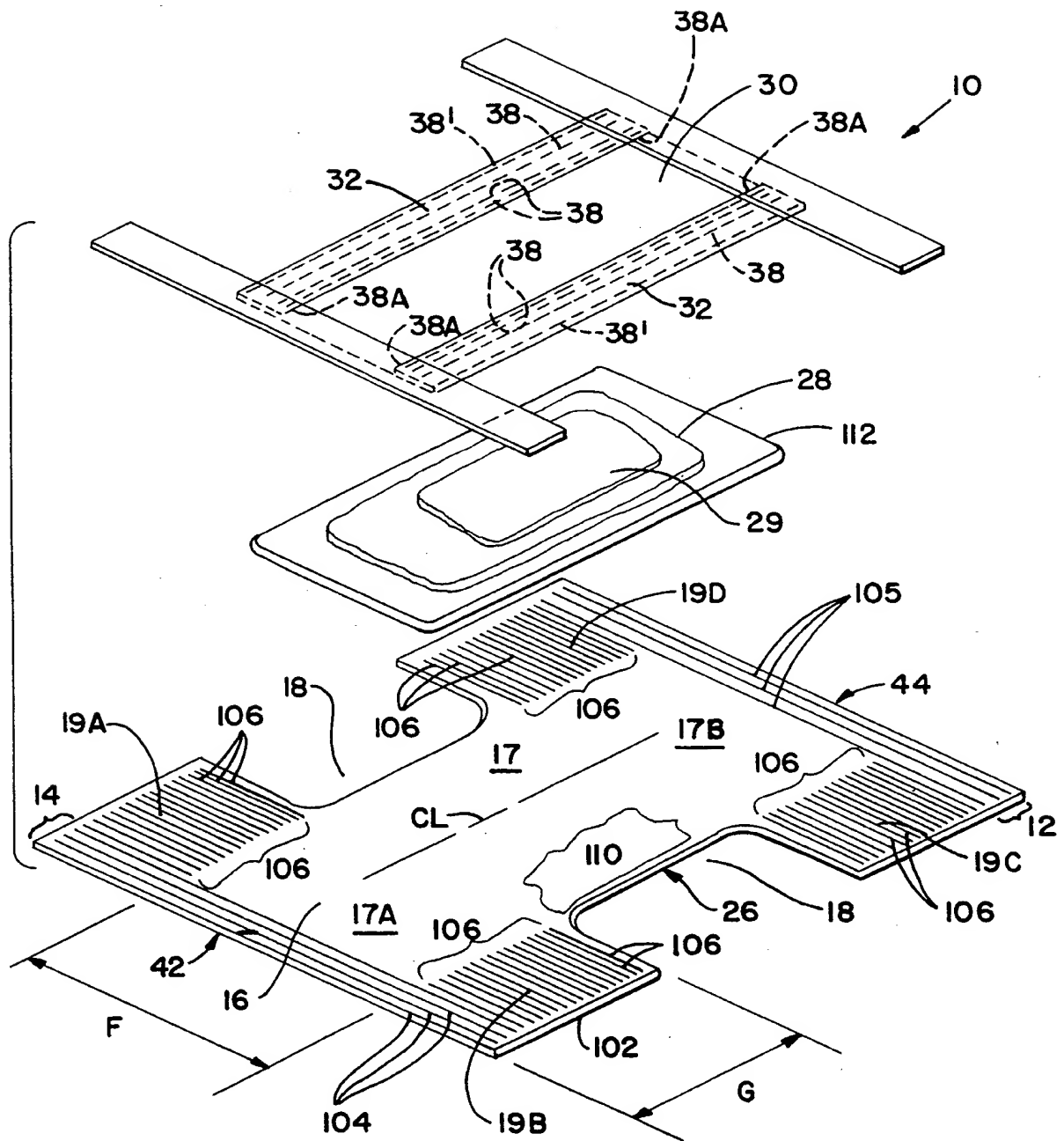


FIG. 3





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/18975

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A61F 13/15

US CL : 604/385.2, 396, 398

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.2, 393, 394, 396-398

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,743,241 A (IGAUE et al) 10 May 1988, Figs. 3 and 5.	11, 18, 23, 24
Y	US 4,695,278 A (LAWSON) 22 September 1987, col. 5 line 9, and col. 9 lines 6-8.	15, 19, 21, 22
Y	US 5,403,301 A (HUFFMAN et al) 04 April 1995, figures, Abstract, col. 55 lines 24-29, and col. 8 lines 29-60.	13, 15, 19, 21, 22
Y	GB 2 268 389 A (WATANABE et al) 12 January 1994, page 11 second to last line to page 12 line 16, and paragraph bridging pages 13 and 14.	15, 19, 21, 22



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 NOVEMBER 1998

Date of mailing of the international search report

18 DEC 1998

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## INTERNATIONAL SEARCH REPORT

International application No.  
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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	JP 3-231660 A (TABATA et al) 15 October 1991, figures, and page 6 lines 6 and 7 of translation.	12, 14, 16-18, 20 ----- 1-11, 13, 15, 19, 21-24
Y	JP 4-161152 A (KAO CORP) 04 June 1992, figures, and Abstract.	1-11, 23, 24
Y	JP 6-197920 A (ZUIKOU) 19 July 1994, figures, and Abstract.	1-11, 23, 24

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